PART 1 - GENERAL

1.1 RELATED DOCUMENTS

   A. Streets, Sidewalks & Bicycle Paths (located in General Guidelines/Sites and Grounds)
   B. Drawing 33 40 00-01, Bicycle Safe Storm Inlet Grate

PART 2 - PRODUCTS

2.1 PIPE APPLICATIONS FOR UNDERGROUND STORM SEWERS

   A. Preferred piping is PVC to reduce the instances of tree root damage however reinforced concrete and vitrified clay piping is also acceptable.

      1. Reinforced concrete sewer pipe and fittings.
      2. Extra strength vitrified clay sewer pipe and fittings.
      3. PVC gasket joint sewer pipe and fittings, ASTM D3034 or ASTM F891 cellular core.

2.2 MANHOLES

   A. Precast Concrete Manholes: ASTM C 478, precast reinforced concrete.

      1. Base Section: 6 inch minimum thickness for floor slab and 4 inch minimum thickness for walls and base riser section, and having a separate base slab or base section with integral floor.
      2. Riser Sections: 4 inch minimum thickness, 48 inch diameter, and lengths to provide depth indicated.
      3. Top Section: Eccentric cone type, unless concentric cone or flat slab top type is indicated. Top of cone to match grade rings.
      4. Grade Rings: 2 or 3 reinforced concrete rings, of 8 to 13 inches total thickness and match 24 inch diameter frame and cover.
      5. Gaskets: ASTM C 443, rubber.
      6. Steps: Cast into base, riser, and top sections sidewall at 16 inch intervals.
      7. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.
      8. Channel and Bench: Concrete.

   B. Cast in Place Manholes:

      2. Channel and Bench: Concrete.
3. Steps: Cast into sidewall at 16 inch intervals.

C. Manhole Steps:
   1. Material: Ductile iron

D. Manhole Frames and Covers: ASTM A 536, Grade 60 40 18, heavy duty, ductile iron, 24 inch inside diameter by 7 to 9 inch riser with 4 inch minimum width flange, and 26 inch diameter cover, indented top design, with lettering "STORM SEWER" cast into cover.

2.3 CLEANOUTS

A. Provide cast iron ferrule and countersunk brass cleanout plug, with round cast iron access frame and heavy duty, secured, cast iron cover.

2.4 CATCH BASINS

A. Precast Concrete Catch Basins: ASTM C 478 or ASTM C 858, precast reinforced concrete, of depth indicated. Sections shall have provision for rubber gasket joints. Base section slab shall have minimum thickness of 6 inches, riser sections shall have minimum thickness of 4 inches and be 36 to 48 inches inside diameter, and top section and grade rings shall match 24 inch frame and grate, unless otherwise indicated.

   1. Base Section: Base riser section and separate base slab, or base riser section with integral floor.
   2. Riser Sections: Sections shall be of lengths to provide depth indicated.
   3. Top Section: Flat slab type with opening to match grade rings.
   4. Grade Rings: Provide 2 or 3 reinforced concrete rings, up to 13 inches total thickness.
   5. Gaskets: ASTM C 443, rubber.
   6. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.
   7. Channel and Bench: Concrete.

B. Cast in Place Catch Basins:

   2. Channel and Bench: Concrete.

C. Catch Basin Steps: Wide enough for an adult to place both feet on one step and designed to prevent lateral slippage off the step.

   1. Material: Ductile iron

D. Catch Basin Frames and Grates: ASTM A 536 Grade 60 40 18, heavy duty, ductile iron, 24 inch inside diameter by 7 to 9 inch riser with 4 inch minimum width flange, and 26 inch diameter flat grate having small square or short slotted drainage openings. Frame and grate shall be IDOT standard frame and grate safe for pedestrians and bicycles—for guidance see IDOT Design and Environment design manual, Bicycle and Pedestrian Accommodation chapter.

E. Curb Inlets: Precast concrete, brick, or other materials, of dimensions conforming to U of I Standards.
2.5 OUTFALLS
   A. Construct of cast in place reinforced concrete pipe, head wall, apron, tapered sides, and with rip rap, as indicated.
      1. Rip Rap: Broken stone, irregular size and shape, weighing 15 to 50 pounds each.

2.6 IDENTIFICATION
   A. Metallic Lined Plastic Underground Warning Tapes: Polyethylene plastic tape with metallic core, 6 inches wide by 4 mils thick, solid green in color with continuously printed caption in black letters "CAUTION SEWER LINE BURIED BELOW."

PART 3 - EXECUTION

3.1 PREPARATION OF FOUNDATION FOR BURIED STORM SEWERAGE SYSTEMS
   A. Grade trench bottom to provide a smooth, firm, stable, and rock free foundation, throughout the length of the pipe.
   B. Remove unstable, soft, and unsuitable materials at the surface upon which pipes are to be laid, and backfill with clean sand or pea gravel to indicated level.
   C. Shape bottom of trench to fit bottom of pipe. Fill unevenness with tamped sand backfill. Dig bell holes at each pipe joint to relieve the bells of all loads and to ensure continuous bearing of the pipe barrel on the foundation.

3.2 INSTALLATION
   A. Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.
   B. All installation shall be in accordance with manufacturer's published recommendations.
   C. General Locations and Arrangements: Drawings (plans and details) indicate the general location and arrangement of the underground storm sewerage system piping. Location and arrangement of piping layout take into account many design considerations. Install the piping as indicated, to the extent practical.
   D. Maximum spacing between storm drain manholes or inlets shall be 300 feet.
   E. Install piping beginning at low point of systems, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings in accordance with manufacturer's recommendations for use of lubricants, cements, and other installation requirements. Maintain swab or drag in line and pull past each joint as it is completed.
   F. Use manholes or catch basins for changes in direction, except where a fitting is indicated. Use fittings for branch connections, except where direct tap into existing sewer is indicated.
   G. Use proper size increasers, reducers, and couplings, where different size or material of pipes and fittings are connected. Reduction of the size of piping in the direction of flow is prohibited.
   H. Install piping pitched down in direction of flow, at minimum slope of 1 percent, except where indicated otherwise.
   I. Extend storm sewerage system piping to connect to building storm drains, of sizes and in locations indicated.
J. Tunneling: Install pipe under streets or other obstructions that cannot be disturbed, by tunneling, jacking, or a combination of both.

3.3 GPS DATA COLLECTION

A. **Minimum 24 hours:** The contractor shall contact the Facilities & Services project representative a minimum of 24 hours prior to backfilling any underground utility installation exterior to the building including excavation for maintenance and/or repair of an existing utility for the purpose of GPS data collection.

3.4 MANHOLES

A. Set tops of frames and covers flush with finish surface where manholes occur in pavement or concrete pads.

3.5 CLEANOUTS

A. Install cleanouts and extension from sewer pipe to cleanout at grade as indicated. Set cleanout frame and cover in concrete block 18 by 18 by 12 inches deep, except where location is in concrete paving. Set top of cleanout 1 inch above surrounding earth grade or flush with grade when installed in paving.

3.6 TAP CONNECTIONS

3.7 CLOSING ABANDONED STORM SEWERAGE SYSTEM

A. Close open ends of abandoned underground piping that is indicated to remain in place. Provide sufficiently strong closures to withstand hydrostatic or earth pressure that may result after ends of abandoned utilities have been closed.

1. Close open ends of concrete or masonry utilities with not less than 8 inch thick masonry bulkheads.

3.8 INSTALLATION OF IDENTIFICATION

A. Install continuous warning wire during back filling of trench for underground water service piping. Locate 6 to 8 inches below finished grade, directly over piping.

**END OF SECTION 33 40 00**

This section of the *U of I Facilities Standards* establishes minimum requirements only. It should not be used as a complete specification.